FHWA R&T NOW

A newsletter about research, development, and technology at the U.S. Department of Transportation's (USDOT) Federal Highway Administration (FHWA).

Infrastructure

Symposium Promotes Cutting-Edge Data Science Practices in Pavement Research

By David J. Mensching, Ph.D., P.E.,
Office of Infrastructure Research and Development

Departments of transportation must understand and track roadway infrastructure conditions, material properties, and weather to keep highways, roads, and bridges in a state of good repair. Data are collected every day in electronic and hardcopy formats, but the integration of this information into databases that communicate across the pavement lifecycle has proven to be an immense challenge. The current management and integration processes present significant resource challenges for stakeholders.

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To facilitate this integration process for improved data-driven decisionmaking capabilities, the FHWA Office of Infrastructure Research and Development developed the International Data Science for Pavements Symposium (DSPS). This symposium brings stakeholders together across a wide range of expertise levels to build knowledge at the intersection of data science and pavement research and share ideas, techniques, demos, and data sources.

In recent years, FHWA has actively promoted data science research practices to share knowledge. Whether setting up a task force to assess staff capability or building new resources across the agency, data science has been gaining considerable attention.

Contents

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The Office of Infrastructure Research and Development at the Turner-Fairbank Highway Research Center (TFHRC) recognizes the potential for applying this discipline to pavements and research.

In 2022, TFHRC hosted the first DSPS. The hybrid DSPS22 event was the first of its size held at TFHRC and was cosponsored by the University of Missouri, the University of New Hampshire, and the Transportation Research Board. All data science experience levels were invited, and more than 360 people registered for the event—including 310 virtual attendees and 50 onsite at TFHRC.

DSPS22 kicked off with a hands-on, day-long, workshop that introduced data science principles. During this workshop, the R programming language was used to analyze a sample of pavement management data from a State highway agency. The symposium then moved to a technical program consisting of 53 presentations that covered the topics of asset management, materials, pavement design, and pavement management.

Support from FHWA's Office of Preconstruction, Construction, and Pavements allowed three Boise State University students to participate in person for the student spotlights portion of DSPS22. These students, winners of the inaugural student data competition, presented their distress characterization techniques using machine learning and data science tools. Representatives from 15 State highway agencies and individuals from 36 countries spanning 6 continents attended this symposium.

DSPS22 closed with an agency roundtable about how the pavements community could come together to be more efficient and innovative with its large datasets. DSPS23 was held as a Webinar Week event, with 3 days of research presentations. DSPS24 was then held at TFHRC March 11–14, 2024.

DSPS24 included events similar to those in DSPS22, such as the presymposium workshop, student spotlights, research presentations, and agency roundtable. However, DSPS24 covered the digital roads topic and had an application brainstorming session. This brainstorming session connected disparate use cases and identified new data sources and avenues for collaboration between agency, industry, and university stakeholders. Stay tuned for an event recap in the July 2024 *R&T Now* issue.

For more information, see the DSPS24 website.[1]

Reference

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https://highways.dot.gov/research/safety/hsis

Exploratory Advanced Research Program

Understanding Traveler Behavior to Mitigate Traffic Congestion

By David Kuehn, Team Director/Program Manager, Office of Corporate Research, Technology, and Innovation Management

Traffic congestion is an ongoing problem throughout the United States. In 2022, the average U.S. driver lost 51 hours due to congestion.[1] Such congestion is often due to travel demand exceeding highway capacity. Using managed lanes (MLs), which FHWA defines as "highway facilities or a set of lanes in which operational strategies are implemented and managed (in realtime) in response to changing conditions," has emerged as a congestion mitigation method.[2]

Examples of MLs in practice include high-occupancy toll lanes, priced lanes, and special-use lanes. In addition to addressing congestion, ML tolls have become a significant revenue source for agencies.[2] Yet roadway operators often do not know the optimal toll pricing for MLs, which requires a better understanding of traveler behavior. As a result, FHWA's Exploratory Advanced Research (EAR) Program sponsored a study to investigate traveler behavior called Using Behavioral Economics to Better Understand Managed Lane Use.

MLs provide travelers an opportunity to choose between traveling on the generally faster MLs by paying a toll or traveling for free on the adjacent general-purpose lanes (GPLs). Traditional toll pricing models assume a perfectly rational individual (i.e., one who maximizes individual utility and makes conscious, rational decisions each time) will choose a lane based on traffic conditions and toll pricing. However, recent research has shown that many travelers are not making that choice. Rather, some travelers do not actively choose between MLs and GPLs. These travelers are known as nonchoosers. They stick to a lane regardless of traffic conditions.

A 2.5-year study of travelers on Katy Freeway in Houston, TX, found that more than 80 percent were nonchoosers.[3] This study sought to gain a more accurate, real-world understanding of traveler behavior and predict which travelers would choose between MLs and GPLs and which would not.

The project was divided into three phases. The first phase involved conducting a survey and a behavioral economic (BE) experiment with 251 participants.

© Texas A&M Transportation Institute.
Example of a managed lane.

The survey gathered various data about the travel habits of participants and their socioeconomic and psychological traits. For the BE experiment, participants used a computer to make lane-change choices based on two road options. In the second phase, 40 individuals participated in a video-based study where they watched 8 real-life highway traffic simulations in the Northern Virginia region and were given the option to change from a GPL to an ML. Different messaging options for nudging drivers to use MLs were evaluated. Phase 3 involved a 3-month field study of 108 participants whose daily travel on regional highways in Dallas, TX, and Virginia was monitored. The participants were split evenly into three groups: a control group, a message group that received a daily message regarding likely travel speed differential on the MLs and GPLs for an upcoming trip, and a free trip group that could get reimbursed for one preselected ML trip per week.

Based on the study's results, the research team developed a model that could predict with 86-percent accuracy if a given traveler was a chooser or a nonchooser and the lane that choosers would select. The researchers recognize that more work needs to be done before this model can be used to predict traffic and toll revenue on MLs. A larger sample with a greater representation of nonchoosers would be needed to further validate the study results. However, this work has laid a foundation for creating a workable model that supports roadway operators and agencies managing traffic congestion with MLs.

For more information on this study, please reach out to Valentin Vulov (valentin.vulov@dot.gov) or check out this fact sheet.[4]

References

1. Schaper, D. 2023. "Traffic Congestion Got Much Worse in 2022 But Is Still Below Pre-Pandemic Levels." *National Public Radio*, January 10, 2023. https://www.npr.org/2023/01/10/1148205765/traffic-congestion-got-much-worse-in-2022-but-is-still-below-pre-pandemic-levels, last accessed February 8, 2024.
2. Obenberger, J. 2004. "Managed Lanes." *Public Roads* 68, no. 3. https://highways.dot.gov/public-roads/novemberdecember-2004/managed-lanes, last accessed February 8, 2024.
3. Goodin, G., R. Benz, M. Burris, M. Brewer, N. Wood, and T. Geiselbrecht. 2013. *Katy Freeway: An Evaluation of a Second-Generation Managed Lanes Project*. Report No. FHWA/TX-13/0-6688-1. Austin, TX: Texas Department of Transportation.
4. FHWA. 2020. *Safer, More Reliable Transportation with Behavioral Economics: Cellphone Use and Managed Lane Choice*. Publication No. FHWA-HRT-20-013. Washington, DC: FHWA. https://highways.dot.gov/research/publications/ear/FHWA-HRT-20-013, last accessed February 12, 2024.

Safety

Improving Traffic Intersection Safety Controls with Award-Winning Research

By In-Kyu Lim, Ph.D., P.E., Michael Dimaiuta, P.E., and Seyedehsan Dadvar, Ph.D., RSP1, Office of Safety and Operations Research and Development

According to USDOT, "Intersection safety is a growing issue, especially for vulnerable road users."[1] When it comes to deciding what safety control measure to install at an intersection, the choices should be based on several factors, including scope and safety as well as multimodal, operational, and cost analyses.[2]

The *Highway Safety Manual* (HSM) Part C[3] includes methods for estimating the predicted average crashes for specific intersection configurations and traffic control types on rural two-lane and multilane highways, and urban/suburban arterials. Many agencies use the results of these methods to inform and support decisions related to planning, design, and operations. The evaluation of traffic control devices at intersections often entails selecting the appropriate intersection control type, e.g., stop controlled (ST) or signalized (SG). FHWA conducted a study called A Comparative Sensitivity Analysis on Intersection Crash Prediction Models by Control Type: Highway Safety Manual Approach[4] to address the struggles that some agencies have faced in applying HSM results to make such decisions.

While it is intuitive for experienced safety engineers to expect that SG intersections would experience fewer crashes than ST intersections—especially at higher traffic volumes and for fatal and injury crashes—this pattern is not consistently found with the HSM predictive models. Focusing on nonramp terminal, four-leg intersections across a range of facility types (rural two-lane and multilane highways and urban arterials), the research team found that many crash prediction models (CPMs) produce results that could be considered counterintuitive and/or inconsistent. An extension of FHWA's investigation to include some State agency-developed safety performance functions (SPFs) and calibration factors for HSM intersection models developed by various agencies similarly found mixed results.

Conclusions drawn from this research include the strong impact of traffic volumes–with the "safer" traffic control option often depending on specific combinations of major and minor road annual average daily traffic and that the impact of signalization on safety can vary greatly by crash severity. Calibration of HSM models by selected States produced less intuitive results for intersections on rural two-lane highways and urban/suburban arterials and more intuitive results for rural multilane highways. Outcomes of the State-developed CPMs showcased diverse results: Some favored SG intersections; others favored ST intersections; and some demonstrated mixed outcomes. The findings highlight the importance of considering local characteristics and traffic patterns in intersection safety evaluations and also point to the need for further research on the complex relationship of the change in safety associated with a change in traffic control.

The study's researchers, In-Kyu Lim, Michael Dimaiuta, and Seyedehsan Dadvar, won the 2024 Best Paper Award from the Transportation Research Board (TRB) Standing Committee on Safety Performance and Analysis at the 2024 TRB Annual Meeting in Washington, DC.

References

1. USDOT. n.d. "Intersection Safety Challenge" (web page) https://its.dot.gov/isc/, last accessed February 13, 2024.
2. FHWA. 2020. *Primer on Intersection Control Evaluation (ICE)*. Report No. FHWA-SA-18-076. Washington, DC: Federal Highway Administration. https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa18076.pdf, last accessed February 14, 2024.

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Operations

Shaping Tomorrow's Transportation: Open-Source Tools for Intelligent Vehicles and Connected Infrastructure

By Stephen Moyer, Communications Manager, Saxton Transportation Operations Laboratory; Frank Nieto, Technical Writer and Writer, Saxton Transportation Operations Laboratory

The U.S. transportation system faces an array of seemingly intractable problems, including traffic deaths, vehicle emissions, and distracted driving. Connected and automated vehicle (CAV) technologies promise a future where these problems are drastically reduced, including:[1]

- A 90-percent reduction in traffic deaths.
- A 60-percent drop in vehicle emissions.
- A 40-percent reduction in travel time.

But to realize this future requires unprecedented cooperation and collaboration between industry and all levels of Government. As a result, FHWA's Saxton Transportation Operations Laboratory (STOL) and its Cooperative Driving Automation (CDA) Program developed open-source tools that aid in CAV and CDA research.

By providing open-source software tools, FHWA breaks down barriers and empowers a diverse community of researchers and developers. This work fosters a collaborative environment between industry, academia, Government, and other stakeholders. To further unlock the potential of CDA, FHWA actively coordinates stakeholder engagement, including workshops, to jointly develop strategies for accelerating the development and deployment of these technologies.

The suite of open-source tools includes communication, data storage, and data collection applications, such as CARMA Cloud℠, CARMA Streets℠, V2X Hub℠, and CARMA Messenger℠.[2,3] The applications facilitate interoperable connectivity between smart infrastructure and automated driving systems as well as encourage greater cooperation with nonautomated vehicles and other road users (e.g., pedestrians, bicyclists) to enhance transportation safety and efficiency. For example, during a traffic incident, a first-responder vehicle can send messages using the CARMA Messenger to get other vehicles to slow down and avoid a certain lane.

Researchers at STOL have also created tools for ongoing testing of CAV and CDA technologies' impact on transportation system safety and operations, including CARMA Platform℠, CARMA 1Tenth, and CDASim.[3,4] The accessible nature of these tools reduces the cost of conducting CAV and CDA technology research and development.

The suite of CARMA℠ products promotes collaboration between stakeholders to develop, implement, and deploy innovative CDA and CAV technologies. Together these tools are designed to shape the future of transportation that is safer and more efficient. For more information about the work being done to develop this next-generation technology, please visit https://highways.dot.gov/research/operations/CARMA.[5]

References

1. Thales. 2021. "7 Benefits of Autonomous Cars" (web page). https://www.thalesgroup.com/en/markets/digital-identity-and-security/iot/magazine/7-benefits-autonomous-cars, last accessed February 9, 2024.
2. FHWA. 2023. *Saxton Transportation Operations Laboratory Research Tools to Enhance Connected and Automated Vehicle (CAV) Capabilities*. Publication No. FHWA-HRT-24-035. Washington, DC: Federal Highway Administration.
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Safety
Complete Streets: A More Encompassing Approach to Safer Roads

By In-Kyu Lim, Highway Research Engineer, FHWA Office of Safety and Operations Research and Development

For many decades, most roadways have been planned and designed to enable vehicles to move as quickly and smoothly as possible. As a result, the multifaceted roles that roadways play in people's lives, such as safety, sustainability, and vitality, have been regularly overlooked. According to the National Highway Traffic Safety Administration (NHTSA), the United States experienced 42,939 traffic fatalities in 2021, of which 8,354 (19.5 percent) were pedestrians and bicyclists. The question is, how does the United States reduce fatalities and serious crashes to make streets safer for vehicles as well as vulnerable road users, such as pedestrians and bicyclists?[1]

Complete Streets is a strategy to plan, design, build, operate, and maintain roadway networks that prioritize safety, comfort, and connectivity to destinations by minimizing or eliminating fatalities and serious injuries for all road users. FHWA is leading efforts to overcome challenges and capitalize on opportunities to implement the Complete Streets initiative.[2]

Substantial evidence exists that the Complete Streets approach reduces fatalities and serious injuries for all road users. However, there are limited studies that have focused on the quantified effects and benefits of multiple safety treatments implemented together through Complete Streets transformations using the *Highway Safety Manual's* safety analysis method.[3]

The Complete Streets—Safety Analysis study provides practitioners and other stakeholders a resource that describes current capabilities, best practices, and future data and analysis needs for quantifying the safety performance effects of Complete Streets projects. This study aimed to "1) identify pedestrian and bicyclist safety treatments that agencies implemented in combination on Complete Streets projects, 2) determine which treatments have quality [crash modification factors (CMF)] for crash types and severities, and 3) characterize and assess existing methods for combining multiple CMFs."[4]

The study identified a geographically diverse sample of 85 Complete Streets projects and explored and summarized common and combined Complete Streets treatments by area type and treatment categories. The study also provided an assessment of current CMFs for quantifying the safety performance effects of common Complete Streets treatments. The research report describes the data and preparation required to measure the safety benefits of Complete Streets and the step-by-step walkthrough of the analysis methods using case studies. Common challenges and limitations in existing data and methods for future research needs are also discussed. For more information on this study, see the final report.[4]

References

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PUBLICROADS

Is your State DOT working on an innovative project? WE WANT TO KNOW MORE!

Public Roads magazine highlights cutting-edge State- and local-level transportation research, programs, and initiatives that demonstrate successful partnerships, innovation, and helpful best practices.

Please reach out to the *Public Roads* magazine editor, Allison Simmons-Jacobi, via email (a.simmonsjacobi.ctr@dot.gov) if you have a project worth sharing with the transportation community.

Source: FHWA.

FHWA Trivia

How did TNT come into use in road construction?

In the early 20th century, the predecessor of FHWA, the Bureau of Public Roads, endorsed the use of TNT; an explosive technology that is still in use today.

During World War I (July 1914–November 1918), the Nation faced great shortages in road construction materials due to the war effort—with steel and oil in demand for the fighting in Europe. These shortages of material required innovations in road building, which often meant making do with less and going back to older methods of construction. Wood often replaced steel in the construction of bridges.

However, once the war ended, a building boom was sparked in part by massive quantities of surplus war materials. TNT—once a powerful explosive on the battlefield—became a useful technological innovation in road construction, as the Nation turned its swords into plowshares.

FHWA

Transportation Pooled Fund (TPF) Program

Upcoming Training

Please join us for a TPF Program training in June 2024. The training will provide an overview of the TPF Program and the administration and logistics of participating in and leading TPF studies.

A calendar invitation and further information will be sent out in the coming weeks as well as posted on the TPF website, www.pooledfund.org.

TPF TRANSPORTATION POOLED FUND

U.S. Department of Transportation
Federal Highway Administration

https://pooledfund.org

Events

Forum of European National Highway Research Laboratories: Transport Research Arena
April 14–19, 2024
Dublin, Ireland
Dr. Kelly Regal, kelly.regal@dot.gov

Speed Management Peer Exchange Meeting
April 15–16, 2024
In-Kyu Lim, in-kyu.lim@dot.gov

Panel discussion: Transportation Is a Part of Real Estate, Not Apart from Real Estate
April 18, 2024 9:30–11 a.m.
SAE World Congress 2024, Detroit, MI
Danielle Chou, danielle.chou@dot.gov

Presentation: Revolutionizing How Connected Transportation Systems Are Integrated and Tested
April 18, 2024 1:30–5 p.m.
SAE World Congress 2024, Detroit, MI
Danielle Chou, danielle.chou@dot.gov

SIS21: Applications of Cooperative Driving Automation (CDA) in the Real World
April 24, 2024 8–9:30 a.m.
Phoenix Convention Center,
ITS America Annual Meeting, Phoenix, AZ
Sudhakar Nallamothu, s.nallamothu@dot.gov

Presentation: Navigating the Road Ahead: Exploring Cooperative Driving Automation Deployment
April 24, 2024 8:30–9:30 a.m.
101A West Building, Phoenix Convention Center,
ITS America Annual Meeting, Phoenix, AZ
Stephen Moyer, stephen.moyer.ctr@dot.gov

SIS27: Open-Source Infrastructure Tools for Interoperable Connectivity Between Intelligent Transportation Systems
April 24, 2024 1–2 p.m.
Phoenix Convention Center,
ITS America Annual Meeting, Phoenix, AZ
Sudhakar Nallamothu, s.nallamothu@dot.gov

Presentation: Open-Source Infrastructure Tools for Interoperable Connectivity
April 24, 2024 1–2 p.m.
101A West Building, Phoenix Convention Center,
Phoenix, AZ
Stephen Moyer, stephen.moyer.ctr@dot.gov

SIS27: Open-Source Infrastructure Tools for Interoperable Connectivity Between Intelligent Transportation
April 24, 2024 3–4:30 p.m.
Phoenix Convention Center,
ITS America Annual Meeting, Phoenix, AZ
Sudhakar Nallamothu, s.nallamothu@dot.gov

Presentation: Cooperative Driving Automation for Freight Operations and Safety
April 24, 2024 3–4:30 p.m.
101B West Building,
Phoenix Convention Center, Phoenix, AZ
Stephen Moyer, stephen.moyer.ctr@dot.gov

Transportation Research Board Research and Technology Coordinating Committee Meeting
May 1–2, 2024
Beckman Center, Irvine, CA
Janet Frenkil, janet.frenkil@dot.gov

Presentation: Field Performance of Reclaimed Asphalt Pavements Combined with Warm Mix Technology–Evaluation of Accelerated Pavement Testing Sections
June 3–7, 2024 (exact date TBD[1])
International Society for Asphalt Pavements Conference, Montreal, QC
David Mensching, david.mensching@dot.gov
Podium presentation on the linkage between laboratory and field performance of FHWA's accelerated pavement testing experiment using different warm-mix asphalt technologies.

Permeable Pavement Systems: Sustainable Case Studies
June 6–8, 2024 (exact date TBD[1])
6th International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment Conference, Arlington, VA
Amir Golalipour, amir.golalipour@dot.gov
This paper presents the environmental impacts of integrating permeable pavement systems in urban areas, particularly the effects on lifecycle assessment. The outcome is presented from case studies in the United States (Oregon, Missouri, Minnesota, Louisiana, Wisconsin, New Jersey, and Georgia), as well as international case studies (China, Australia, the Netherlands, and the United Kingdom).

Forum of European National Highway Research Laboratories General Board meeting
June 17–18, 2024
Budapest, Hungary
Dr. Kelly Regal, kelly.regal@dot.gov

[1]TBD = to be decided.

Presentation: Evaluating Impact of Speed Variability on Rural Two-Lane Roadway Departure Crashes

July 21–24, 2024

2024 ITE Annual Meeting, Philadelphia, PA

Mohamad Banihashemi, mohamad.banihash@dot.gov

American Association of State Highway and Transportation Officials (AASHTO) Research Advisory Committee meeting

July 21–25, 2024

Columbus, OH

Dr. Kelly Regal, kelly.regal@dot.gov

Transportation Research Board: Automated Road Transportation Symposium

July 29–August 1, 2024

San Diego, CA

Dr. Kelly Regal, kelly.regal@dot.gov

This event will provide updates on the current research and development, advanced engineering progress, and field deployment results. The symposium will also provide a strong focus on issues impacting USDOT and State departments of transportation resulting from road vehicle automation advancements. It builds on the highly successful 2012–2020 Automated Vehicle Symposia and the 2021–2023 Automated Road Transportation Symposia.

Presentation: Safety Analysis of Protected Intersection Designs for Pedestrians and Bicyclists

August 11–14, 2024

2024 Traffic Records Forum, San Diego, CA

Woon Kim, woon.kim@dot.gov

This presentation will summarize a FHWA project that assessed protected intersection designs to determine if these designs reduce conflicts between moving vehicles and vulnerable road users or lower the impact force by reducing the vehicle speed and changing the impact angle in the event of a collision. The designs examined in this study provided dedicated pedestrians/bicyclists paths through intersections with corner islands to create a bicycle queue area after the crosswalk and to provide a place for bicyclists to wait.

Presentation: FHWA Research on Artificial Intelligence for Traffic Safety

August 11–14, 2024

2024 Traffic Records Forum, San Diego, CA

James Pol, james.pol@dot.gov

FHWA is advancing artificial intelligence research for traffic safety, traffic reliability, and infrastructure. Studies on video analytics for automatic annotation of naturalistic driving data under the Exploratory Advanced Research Program are exploring cooperative perception, micromobility, vulnerable road users, and dilemma zones.

Managed Lanes Symposium

August 12–24, 2024

Transportation Research Board Facility, Irvine, CA

Jon Obenberger, jon.obenberger@dot.gov

AASHTO Committee on Transportation System Operations Annual Meeting and TRB ITS Committee Mid-Year Meeting

August 25–31, 2024

Kansas City, MO

Jon Obenberger, jon.obenberger@dot.gov

Presentation: Resistivity's Sensitivity to Concrete Mixture Design Parameters

August 25–29, 2024

International Conference for Concrete Pavements

Michelle Cooper, michelle.cooper@dot.gov

This presentation will communicate research that proposes resistivity testing as a method sensitive to changes in concrete paste content and water-to-cementitious-materials ratio between mixture acceptance and mixture delivery. The study results demonstrate that resistivity displays the sensitivity needed to determine whether the concrete mixture received varies significantly from the intended concrete mixture design.

Presentation: Examining the Effect of Carbon Enriched Fly Ash on Microstructural Development of PLC Mortars

August 25–29, 2024

International Conference for Concrete Pavements

Erin Stewartson, erin.stewartson@dot.gov

This presentation discusses characterization of the effects of carbon-enriched supplementary cementitious materials (SCMs) on concrete's microstructure and reactivity.

Presentation: Improving Resistance to Damage from Freeze-Thaw of High-Early-Strength (HES) Concrete Mixtures through the Application of AASHTO R 101 Concepts

August 25–29, 2024

International Conference for Concrete Pavements

Michelle Cooper, michelle.cooper@dot.gov

This presentation offers insights into how to qualify and potentially improve the long-term freeze-thaw damage resistance of HES mixtures by implementing performance-engineered mixtures strategies.

Presentation: Concrete Formation Factor: Experimental and Modeling Methods

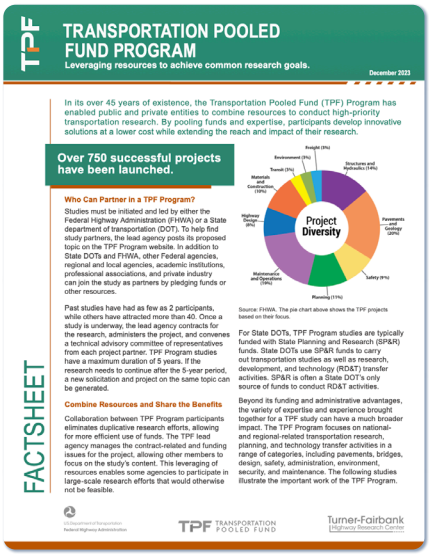
August 25–29, 2024

International Conference for Concrete Pavements

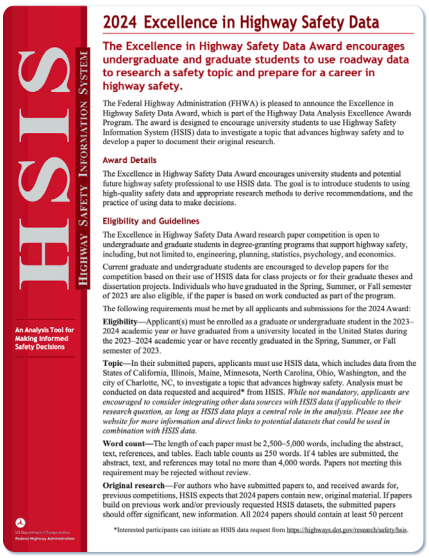
Michelle Cooper, michelle.cooper@dot.gov

This presentation examines various methods for assessing the formation factor of concrete mixtures by combining different conditioning techniques with pore solution modeling.

Recent Publications



Source: FHWA.



Source: FHWA.

[DREDGE (Disaggregate Realistic Artificial Data Generator)—Design, Development, and Application for Crash Safety Analysis, Volume I]

Date: February 22, 2024
Publication No.: FHWA-HRT-23-121

[NextScour Case Study: The I–6064/I–95 Bridge Replacements Over the Lumber River in Lumberton, NC]

Date: February 15, 2024
Publication No.: FHWA-HRT-24-038

[YOUR ROLE as a Partner Agency]

Date: February 15, 2024
Publication No.: FHWA-HRT-24-047

[Implementation of Phased Array Ultrasonic Testing (PAUT) For Bridge Welds]

Date: February 8, 2024
Publication No.: FHWA-HRT-24-010

[FHWA Bridge Preservation Research Roadmap]

Date: February 8, 2024
Publication No.: FHWA-HRT-24-011

[Take the Virtual Tour of the Turner-Fairbank Highway Research Center]

Date: February 8, 2024
Publication No.: FHWA-HRT-24-076

[Guide to Select Long-Term Pavement Performance Traffic Data for Multiple Uses]

Date: February 8, 2024
Publication No.: FHWA-HRT-24-062

[YOUR ROLE as the Lead Agency—State Department of Transportation (DOT)]

Date: February 6, 2024
Publication No.: FHWA-HRT-24-046

[2024 Excellence in Highway Safety Data]

Date: February 6, 2024
Publication No.: FHWA-HRT-24-075

[YOUR ROLE as a Funding Contact]

Date: February 6, 2024
Publication No.: FHWA-HRT-24-042

[YOUR ROLE as the Lead Agency—Federal Highway Administration (FHWA)]

Date: February 6, 2024
Publication No.: FHWA-HRT-24-045

[YOUR ROLE as a Technical Advisory Committee (TAC) Member]

Date: February 5, 2024
Publication No.: FHWA-HRT-24-044

[Compendium of Wrong-Way-Driving Treatments and Countermeasures]

Date: January 31, 2024
Publication No.: FHWA-HRT-23-035

[LTPP Creates Analysis-Ready Datasets]

Date: January 31, 2024
Publication No.: FHWA-HRT-23-079

[Development and Use of the LTPP Analysis-Ready Materials Dataset]

Date: January 25, 2024
Publication No.: FWHA-HRT-23-111

[Virtual Open Innovation Collaborative Environment for Safety (VOICES) - Connected. Cooperative. Cost-effective.]

Date: January 18, 2024
Publication No.: FHWA-HRT-24-066

[Cooperative Driving Automation (CDA) Support Services]

Date: January 17, 2024
Publication No.: FHWA-HRT-24-013

[Cooperative Driving Automation (CDA) - CARMA Tools]

Date: January 17, 2024
Publication No.: FHWA-HRT-22-101

[Perception Sharing for Cooperative Driving Automation (CDA)]

Date: January 17, 2024
Publication No.: FHWA-HRT-24-026

Move Over Law for Traffic Incident Management Using Cooperative Driving Automation (CDA)

Date: January 17, 2024
Publication No.: FHWA-HRT-24-027

Saxton Transportation Operations Laboratory Cooperative Driving Automation (CDA) Tools to Improve Road User Safety

Date: January 17, 2024
Publication No.: FHWA-HRT-24-036

Adaptive Traffic Signal Control Optimization in a Cooperative Driving Automation (CDA) Environment

Date: January 16, 2024
Publication No.: FHWA-HRT-24-025

Saxton Transportation Operations Laboratory Research Tools to Enhance Connected and Automated Vehicle (CAV) Capabilities

Date: January 16, 2024
Publication No.: FHWA-HRT-24-035

Cooperative Driving Automation (CDA) at Stop-Controlled Intersections

Date: January 16, 2014
Publication No.: FHWA-HRT-24-030

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Date: January 16, 2024
Publication No.: FHWA-HRT-24-028

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Date: January 16, 2024
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Date: December 28, 2023
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Date: December 28, 2023
Publication No.: FHWA-HRT-24-016

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Date: December 28, 2023
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Date: December 26, 2023
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Publication No.: FHWA-HRT-24-017

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Date: December 26, 2023
Publication No.: FHWA-HRT-24-014

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Date: December 19, 2023
Publication No.: FHWA-HRT-23-115

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Recommended citation: Federal Highway Administration, *R&T Now, April 2024* (Washington, DC: 2024) https://doi.org/10.21949/1521739

FHWA-HRT-24-069

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U.S. Department of Transportation
Federal Highway Administration